

## CLAIMS:

1-30. (Cancelled)

31. (Currently Amended) A decoding process comprising:

computer implemented steps performed by a processor of a video data decoder to implement the following steps:

receiving a block of coefficients relating to a block of video information to be displayed which has been transformed and quantized for compression of the video information;

providing a single look-up table (LUT) which consists of a group of scaling factors applicable for scaling of coefficients of different block sizes;

computing an index for each coefficient, the index being a function of a quantization parameter, a size of the block of coefficients, and a position of said each coefficient within the block;

indexing the LUT, using the computed index, to determine a scaling factor in the LUT applicable for scaling of said each coefficient, wherein indexing is independent of a size of the block;

scaling the block of received coefficients, using the determined scaling factors, to inversely quantize the block of received coefficients; and

applying a vertical transform and a horizontal transform to the block of scaled coefficient, in order to reconstruct a signal of the block of video information for display of the video signal, wherein basis vectors of the vertical and horizontal transforms are

|      |       |       |       |       |       |       |       |
|------|-------|-------|-------|-------|-------|-------|-------|
| 1    | 1     | 1     | 1     | 1     | 1     | 1     | 1     |
| 12/8 | 10/8  | 6/8   | 3/8   | -3/8  | -6/8  | -10/8 | -12/8 |
| 1    | 1/2   | -1/2  | -1    | -1    | -1/2  | 1/2   | 1     |
| 10/8 | -3/8  | -12/8 | -6/8  | 6/8   | 12/8  | 3/8   | -10/8 |
| 1    | -1    | -1    | 1     | 1     | -1    | -1    | 1     |
| 6/8  | -12/8 | 3/8   | 10/8  | -10/8 | -3/8  | 12/8  | -6/8  |
| 1/2  | -1    | 1     | -1/2  | -1/2  | 1     | -1    | 1/2   |
| 3/8  | -6/8  | 10/8  | -12/8 | 12/8  | -10/8 | 6/8   | -3/8  |

or multiples thereof or a transform thereof.

32. (Cancelled)

33. (Original) The decoding process defined in Claim 31 wherein applying the transform comprises computing the transform using only a sequence of addition, subtraction and shift operations.

34. (Cancelled)

35-36. (Cancelled)

37. (Currently Amended) A computer-implemented decoder for decoding a block of coefficients relating to a block of video information to be displayed ~~which has been transformed and quantized for compression of the video information~~, the decoder comprising:

~~a memory which stores a single look-up table (LUT) which consists of a group of scaling factors applicable for scaling of coefficients of different block sizes;~~

~~an index calculator configured to compute an index for each coefficient, the index being a function of a quantization parameter, a size of the block of coefficients, and a position of said each coefficient within the block;~~

~~an indexer configured to index the LUT, using the computed index, to determine a scaling factor in the LUT applicable for scaling of said each coefficient, wherein indexing is independent of a size of the block;~~

~~a scaler configured to scale the block of received coefficients, using the determined scaling factors, to inversely quantize the block of received coefficients; and~~

~~an inverse transformer to apply a vertical transform and a horizontal transform to the block of scaled coefficients in order to reconstruct a signal of the block of video information for display of the video signal, wherein basis vectors of the vertical and horizontal transforms are~~

|      |       |       |       |       |       |       |       |
|------|-------|-------|-------|-------|-------|-------|-------|
| 1    | 1     | 1     | 1     | 1     | 1     | 1     | 1     |
| 12/8 | 10/8  | 6/8   | 3/8   | -3/8  | -6/8  | -10/8 | -12/8 |
| 1    | 1/2   | -1/2  | -1    | -1    | -1/2  | 1/2   | 1     |
| 10/8 | -3/8  | -12/8 | -6/8  | 6/8   | 12/8  | 3/8   | -10/8 |
| 1    | -1    | -1    | 1     | 1     | -1    | -1    | 1     |
| 6/8  | -12/8 | 3/8   | 10/8  | -10/8 | -3/8  | 12/8  | -6/8  |
| 1/2  | -1    | 1     | -1/2  | -1/2  | 1     | -1    | 1/2   |
| 3/8  | -6/8  | 10/8  | -12/8 | 12/8  | -10/8 | 6/8   | -3/8  |

or multiples thereof or a transform thereof.

38. (Cancelled)

39. (Original) The decoder defined in Claim 37 wherein applying the transform comprises computing the transform using only a sequence of addition, subtraction and shift operations.

40. (Cancelled)

41. (Currently Amended) A computer-readable medium, wherein the computer-readable medium is hardware, storing instructions which, when executed by a system processor of a video data decoder, cause the system processor to:

receive a block of coefficients relating to a block of video information to be displayed ~~which has been transformed and quantized for compression of the video information;~~

~~provide a single look up table (LUT) which consists of a single group of scaling factors applicable for scaling of coefficients of different block sizes;~~

~~compute an index for each coefficient, the index being a function of a quantization parameter, a size of the block of coefficients, and a position of said each coefficient within the block;~~

~~index the LUT, using the computed index, to determine a scaling factor in the LUT applicable for scaling of said each coefficient, wherein indexing is independent of a size of the block;~~

~~scale the block of received coefficients, using the determined scaling factors, to inversely quantize the block of received coefficients; and~~

~~apply a vertical transform and a horizontal transform to the block of scaled coefficients, in order to reconstruct a signal of the block of video information for display of the video signal, wherein basis vectors of the vertical and horizontal transforms are~~

|      |       |       |      |       |      |       |       |
|------|-------|-------|------|-------|------|-------|-------|
| 1    | 1     | 1     | 1    | 1     | 1    | 1     | 1     |
| 12/8 | 10/8  | 6/8   | 3/8  | -3/8  | -6/8 | -10/8 | -12/8 |
| 1    | 1/2   | -1/2  | -1   | -1    | -1/2 | 1/2   | 1     |
| 10/8 | -3/8  | -12/8 | -6/8 | 6/8   | 12/8 | 3/8   | -10/8 |
| 1    | -1    | -1    | 1    | 1     | -1   | -1    | 1     |
| 6/8  | -12/8 | 3/8   | 10/8 | -10/8 | -3/8 | 12/8  | -6/8  |

|     |      |      |       |      |       |     |      |
|-----|------|------|-------|------|-------|-----|------|
| 1/2 | -1   | 1    | -1/2  | -1/2 | 1     | -1  | 1/2  |
| 3/8 | -6/8 | 10/8 | -12/8 | 12/8 | -10/8 | 6/8 | -3/8 |

or multiples thereof or a transform thereof.

42. (Cancelled)

43. (Previously Presented) The computer-readable medium defined in Claim 41 wherein instructions to cause the system to apply the transform comprise instructions which, when executed by the system, cause the system to compute the transform using only a sequence of addition, subtraction and shift operations.

44. (Cancelled)

45. (Currently Amended) A decoder for decoding a block of coefficients relating to a block of video information to be displayed ~~which has been transformed and quantized for compression of the video information, the decoder comprising:~~

~~means for storing a single look up table (LUT) which consists of a single group of scaling factors selectively applicable for scaling of coefficients of different block sizes;~~

~~means for computing an index for each coefficient, the index being a function of a quantization parameter, a size of the block of coefficients, and a position of said each coefficient within the block;~~

~~means for indexing the LUT, using the computed index, to determine a scaling factor in the LUT applicable for scaling of said each coefficient, wherein indexing is independent of a size of the block;~~

~~means for scaling a block of coefficients, using the determined scaling factors, to inversely quantize the block of received coefficients; and~~

~~means for applying a vertical transform and a horizontal transform to the block of scaled coefficients in order to reconstruct a signal of the block of video information for display of the video signal, wherein basis vectors of the vertical and horizontal transforms are~~

|      |      |       |      |      |      |       |       |
|------|------|-------|------|------|------|-------|-------|
| 1    | 1    | 1     | 1    | 1    | 1    | 1     | 1     |
| 12/8 | 10/8 | 6/8   | 3/8  | -3/8 | -6/8 | -10/8 | -12/8 |
| 1    | 1/2  | -1/2  | -1   | -1   | -1/2 | 1/2   | 1     |
| 10/8 | -3/8 | -12/8 | -6/8 | 6/8  | 12/8 | 3/8   | -10/8 |

|     |       |      |       |       |       |      |      |
|-----|-------|------|-------|-------|-------|------|------|
| 1   | -1    | -1   | 1     | 1     | -1    | -1   | 1    |
| 6/8 | -12/8 | 3/8  | 10/8  | -10/8 | -3/8  | 12/8 | -6/8 |
| 1/2 | -1    | 1    | -1/2  | -1/2  | 1     | -1   | 1/2  |
| 3/8 | -6/8  | 10/8 | -12/8 | 12/8  | -10/8 | 6/8  | -3/8 |

or multiples thereof or a transform thereof.

46-64. (Canceled)

65. (New) A decoding method comprising:

computer implemented steps performed by a processor of a video data decoder to implement performing a horizontal transform and a vertical transform on each row and column of an 8x8 block of scaled transform coefficients, using a one-dimensional inverse transform, in a manner using a sequence of only addition, subtraction and shift operations, wherein basis vectors of the vertical and horizontal transforms comprise the following five column vectors:

$$\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \quad \begin{bmatrix} 1 \\ 1/2 \\ -1/2 \\ -1 \\ -1 \\ -1/2 \\ 1/2 \\ 1 \end{bmatrix}, \quad \begin{bmatrix} 10/8 \\ -3/8 \\ -12/8 \\ -6/8 \\ 6/8 \\ 12/8 \\ 3/8 \\ -10/8 \end{bmatrix}, \quad \begin{bmatrix} 1 \\ -1 \\ -1 \\ 1 \\ 1 \\ -1 \\ -1 \\ 1 \end{bmatrix} \text{ and } \begin{bmatrix} 6/8 \\ -12/8 \\ 3/8 \\ 10/8 \\ -10/8 \\ -3/8 \\ 12/8 \\ -6/8 \end{bmatrix}.$$

66. (New) The decoding method according to claim 65, wherein the basis vectors are:

$$\begin{bmatrix} 1 & 12/8 & 1 & 10/8 & 1 & 6/8 & 1/2 & 3/8 \\ 1 & 10/8 & 1/2 & -3/8 & -1 & -12/8 & -1 & -6/8 \\ 1 & 6/8 & -1/2 & -12/8 & -1 & 3/8 & 1 & 10/8 \\ 1 & 3/8 & -1 & -6/8 & 1 & 10/8 & -1/2 & -12/8 \\ 1 & -3/8 & -1 & 6/8 & 1 & -10/8 & -1/2 & 12/8 \\ 1 & -6/8 & -1/2 & 12/8 & -1 & -3/8 & 1 & -10/8 \\ 1 & -10/8 & 1/2 & 3/8 & -1 & 12/8 & -1 & 6/8 \\ 1 & -12/8 & 1 & -10/8 & 1 & -6/8 & 1/2 & -3/8 \end{bmatrix}$$

or multiples thereof or a transform thereof.

67. (New) A decoder for decoding a block of coefficients relating to a block of video information, the decoder comprising:

a processor of a computer system executing program steps to implement an inverse transformer that performs a horizontal transform and a vertical transform on each row and column of an 8x8 block of scaled transform coefficients, using a one-dimensional inverse transform, in a manner using a sequence of only addition, subtraction and shift operations, wherein basis vectors of the vertical and horizontal transforms comprise the following five columns:

$$\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \quad \begin{bmatrix} 1 \\ 1/2 \\ -1/2 \\ -1 \\ -1 \\ -1/2 \\ 1/2 \\ 1 \end{bmatrix}, \quad \begin{bmatrix} 10/8 \\ -3/8 \\ -12/8 \\ -6/8 \\ 6/8 \\ 12/8 \\ 3/8 \\ -10/8 \end{bmatrix}, \quad \begin{bmatrix} 1 \\ -1 \\ -1 \\ 1 \\ 1 \\ -1 \\ -1 \\ 1 \end{bmatrix} \text{ and } \begin{bmatrix} 6/8 \\ -12/8 \\ 3/8 \\ 10/8 \\ -10/8 \\ -3/8 \\ 12/8 \\ -6/8 \end{bmatrix}.$$

68. (New) The decoder according to claim 67, wherein the basis vectors are:

$$\begin{bmatrix} 1 & 12/8 & 1 & 10/8 & 1 & 6/8 & 1/2 & 3/8 \\ 1 & 10/8 & 1/2 & -3/8 & -1 & -12/8 & -1 & -6/8 \\ 1 & 6/8 & -1/2 & -12/8 & -1 & 3/8 & 1 & 10/8 \\ 1 & 3/8 & -1 & -6/8 & 1 & 10/8 & -1/2 & -12/8 \\ 1 & -3/8 & -1 & 6/8 & 1 & -10/8 & -1/2 & 12/8 \\ 1 & -6/8 & -1/2 & 12/8 & -1 & -3/8 & 1 & -10/8 \\ 1 & -10/8 & 1/2 & 3/8 & -1 & 12/8 & -1 & 6/8 \\ 1 & -12/8 & 1 & -10/8 & 1 & -6/8 & 1/2 & -3/8 \end{bmatrix}.$$

69. (New) An article of manufacture comprising one or more recordable media, wherein the one or more recordable media is hardware, storing instructions which, when executed by a processor of a video data decoder, cause the processor to perform a horizontal transform and a vertical transform on each row and column of an 8x8 block of scaled transform coefficients, using a one-dimensional inverse transform, in a manner using a sequence of only addition, subtraction and shift operations, wherein basis vectors of the vertical and horizontal transforms comprise the following five column vectors:

$$\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \quad \begin{bmatrix} 1 \\ 1/2 \\ -1/2 \\ -1 \\ -1 \\ -1/2 \\ 1/2 \\ 1 \end{bmatrix}, \quad \begin{bmatrix} 10/8 \\ -3/8 \\ -12/8 \\ -6/8 \\ 6/8 \\ 12/8 \\ 3/8 \\ -10/8 \end{bmatrix}, \quad \begin{bmatrix} 1 \\ -1 \\ -1 \\ 1 \\ 1 \\ -1 \\ -1 \\ 1 \end{bmatrix} \quad \text{and} \quad \begin{bmatrix} 6/8 \\ -12/8 \\ 3/8 \\ 10/8 \\ -10/8 \\ -3/8 \\ 12/8 \\ -6/8 \end{bmatrix}.$$

70. The decoding method according to claim 69, wherein the basis vectors are:

$$\begin{bmatrix} 1 & 12/8 & 1 & 10/8 & 1 & 6/8 & 1/2 & 3/8 \\ 1 & 10/8 & 1/2 & -3/8 & -1 & -12/8 & -1 & -6/8 \\ 1 & 6/8 & -1/2 & -12/8 & -1 & 3/8 & 1 & 10/8 \\ 1 & 3/8 & -1 & -6/8 & 1 & 10/8 & -1/2 & -12/8 \\ 1 & -3/8 & -1 & 6/8 & 1 & -10/8 & -1/2 & 12/8 \\ 1 & -6/8 & -1/2 & 12/8 & -1 & -3/8 & 1 & -10/8 \\ 1 & -10/8 & 1/2 & 3/8 & -1 & 12/8 & -1 & 6/8 \\ 1 & -12/8 & 1 & -10/8 & 1 & -6/8 & 1/2 & -3/8 \end{bmatrix}.$$